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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,358	05/22/2001	Takehiko Kezuka	P07223US00/L	6873

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EXAMINER	
UMEZ ERONINI, LYNETTE T	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 10/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/856,358	KEZUKA ET AL.	
	Examiner	Art Unit	
	Lynette T. Umez-Eronini	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 5-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1, 2, 5, 6, and 9-16* is/are rejected.

7)☒ Claim(s) *7 and 8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 11, 12, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Schwabe (US 3,977,925).

Schwabe teaches, ". . . an etchant composed of a mixture containing for each 100 gr of HNO_3 (same as applicants' inorganic acid), 20 gr of H_2O, 4 gr of HF and 110 gr of CH_3COOH (Abstract), which reads on and encompasses,

An etching solution comprising:

(i) hydrofluoric acid;

(ii) water in a concentration of 30% by weight or lower; and

(iii) at least one member selected from the group consisting of an organic acid, an inorganic acid and an organic solvent having a hetero atom, whose content ranges from 30 to 99.9% by weight. Since Schwabe teaches the same etchant as claimed by applicants, then using Schwabe's etchant in the same manner as the claimed invention would inherently result wherein the etching solution has a ratio of an etch rate of a boron silicate glass film (BSG) or boron phosphosilicate glass/ an etch rate of a thermal oxide film (THOX) at 25^0C of 20 or higher, **in claim 1**.

The said above reads,

wherein the solution comprises an inorganic acid, **in claim 11**;

wherein the inorganic acid has a pK_a value at 25°C of 2 or lower, **in claim 12**;

Schwabe further teaches a process for producing a semiconductor arrangement from a monocrystalline silicon substrate for use in an integrated circuit by etching a silicon substrate (claim 1), which reads on,

a method for producing an etched article by etching an article to be etched with the etching, **in claim 15**; and

an etched article which is obtainable by the method of claim 15, **as in claim 16.**

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 5, 9, and 10 are rejected under 35 U.S.C. 103(a) as obvious over Schwabe (US '925), as applied to claim 1 above, and in view of McCollister et al. (US 4,273,826).

Schwabe differs in failing to teach in failing to specify the % by weight ratio of the components of the etching solution as recited **in claims 5, 9, and 10**.

McCollister teaches an etchant solution containing a 47 weight percent solution of HF in water, 7.6 ml of a 37 weight percent of HCl in water and 112 ml of alcohol consisting of 90.2 weight percent ethanol, 4.8 weight percent methanol, and 5 weight percent isopropanol (column 4, lines 40-45) and illustrates that the specific combination of HF, water, and organic solvent (i.e. ethanol, methanol, and isopropanol) and HF, HCl, and water is known. As a result, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select any proportion of HF, alcohol, and water and HF, HCl, and water in the reference of McCollister that would effectively accomplish the disclosed composition because it has been held that there is no invention where the difference in proportions is not critical and was ascertained by routine experimentation because the determination of workable ranges is not considered inventive. See In re Swain and Adams, 70 USPQ 412 (CPA 1946).

6. Claims 2 and 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwabe US '925) as applied to claim 1 above, and further in view of Grant et al. (US 5,439,553).

Schwabe differs in failing to teach a solvent in the etching solution has a relative dielectric constant of 61 or lower, **in claim 2**.

Grant teaches an etchant comprising HF along with organic materials such as methanol, isopropanol, acetone and acetic acid (column 5, line 63 – column 6, line 6 and claims 3-5) and further teaches these solvents prevent condensation and other contaminants on the oxide surface (column 3, lines 43-54)

It would have been obvious to one skilled in the art at the time of the claimed invention to modify Schwabe by employing a solvent having a dielectric constant of less than 61 as taught by Grant for the purpose of preventing deposition of contaminants of the substrate (Grant, column 3, lines 43-54).

Schwabe differs in failing to teach in failing to specify the % by weight ratio of the components of the etching solution as recited, **in claim 6**.

Grant discloses wet etching has prevalently been disclosed with HF, water and acetic acid alone (column 1, lines 57-59) and illustrates that the specific combination of HF, water, and acetic acid is known. As a result, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select any proportion of HF, acetic acid, and water in the reference of Grant that would effectively accomplish the disclosed composition because it has been held that there is no invention where the

difference in proportions is not critical and was ascertained by routine experimentation because the determination of workable ranges is not considered inventive. See In re Swain and Adams, 70 USPQ 412 (CPA 1946).

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwabe (US '925) as applied to claim 1 above, and further in view of Wanlass (US 3,997,381).

Schwabe differs in failing to specify the percent weight ratio of HF: HNO3: water is 0.01-50: 1-70: 0-99.

Wanlass teaches an etching solution comprising of hydrofluoric (49% by weight), nitric (70% by weight), (column 7, lines 10-14), which encompasses the percent weight ratio of HF:HNO_3:water is 0.01-50:1-70:0-99 and illustrates that the specific combination of HF, HNO_3, and water is known. As a result, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select any proportion of HF, HNO_3, and water in the reference of Wanlass that would effectively accomplish the disclosed composition because it has been held that there is no invention where the difference in proportions is not critical and was ascertained by routine experimentation because the determination of workable ranges is not considered inventive. See In re Swain and Adams, 70 USPQ 412 (CPA 1946).

Allowable Subject Matter

8. Claims 7 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record taken alone or in combination fails to suggest, teach or render obvious an etching solution comprises a constituent ratio respectively, of HF : tetrahydrofuran : water and HF : acetone : water is 0.1-50% by weight : 30-99.9% by weight : 0-70% by weight.

Response to Arguments

10. Applicant's arguments, see Remarks, filed July 30, 2004, with respect to the rejection(s)of claim(s) 1, 11, 15, and 16; and 2-10, 12-13, and 14 under 102(b) and 103(a) respectively have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of applicants' amendment of claims 1, 5-6, 9-14, which recites "an etching solution comprising: --(i)-- hydrofluoric acid; --(ii) water in a concentration of 30% by weight or lower; and (iii) at least one member selected from the group consisting of an organic acid, an inorganic acid and an organic solvent having a hetero atom, whose content ranges form 30 to 99.9% by weight, -- . . ."

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Art Unit 1765

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September 6, 2004

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER